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Igcse chemistry formula sheet pdf

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Relative Formula Mass (RfM): The RfM is the sum of the relative atomic masses of all atoms in a compound. This is calculated by adding the mass of carbon-12 to the masses of other atoms, with the ratio being 1:12. **Moles**: Moles are units of amount of substance. To calculate moles, divide the mass of a sample by its RfM. For example, if you have 22g of CO2, the number of moles is 0.5 (22/44). The text then provides examples of calculating moles and mass from given amounts, as well as concentration calculations. **Avogadro's Constant**: One mole of a substance contains 6.02 x 10^23 particles. The text also covers balanced chemical equations and how to use them to calculate masses from reactions. For example, if you want to know the mass of magnesium oxide produced when 6g of magnesium is burned in air, you can use the following steps: 1. Write the balanced chemical equation: 2Mg + O2 → 2MgO 2. Write known values on the left and unknown value on the right 3. Use the moles relationship from the balanced equation to calculate the number of moles of magnesium oxide 4. Convert moles into mass using the RfM 5. Do the math to get the final answer (in this case, 10g) The text also provides an example of calculating the mass of aluminum needed to produce a certain amount of aluminum oxide. Looking forward to seein everyone at the meeting tomorow and discussin our strategies. The reactant that get all used up completely is the limiting reagent. Th other reagent which is present in greater quantity than required is in excess. A steel plant makes 28 g of ammonia from 32 g of nitrogen and hydrogen, giving a percentage yield of 93.75%. An iron oxide factory produces 20 g of iron from 80 g of iron oxide, yielding 35.71%. The reason for this lower-than-expected yield is that the reaction does not always go to completion due to various factors such as reversibility, loss or contamination of reactants or products. Calcium Oxide production has an atom economy of 56% through the reaction CaCO3 → CaO + CO2. The iron oxide reduction reaction with carbon also yields an atom economy of 57%. Single Product and Titration Methods for Accurate Neutralization Reactions Producing a single product from byproducts can enhance atom economy. When titration is employed, it's essential to measure the exact volume of acid or base to achieve neutralization. The titration process involves adding known concentrations of solutions, monitoring changes in indicators, and recording measurements. ### Titration Procedure 1. Prepare a conical flask with a solution of known concentration. 2. Add an indicator to the solution. 3. Record the initial volume of the unknown concentration solution in the burette. 4. Gradually add the unknown solution to the conical flask while mixing regularly. 5. Stop adding when the indicator changes color, indicating complete neutralization. 6. Record the final burette reading and repeat steps 3-5 three times. ### Titration Example A 10 cm³ sample of 0.5 mol dm³ sulfuric acid was titrated with sodium hydroxide. The results showed a mean titrate value of 25.29 cm³. The art of chemical reactions! Let's dive into the world of molecules, atoms, and chemical equations. First off, we've got our limiting reagent - that's the one that gets used up completely during the reaction. Then there's yield, which is the amount of desired product you get from a reaction. Percentage yield calculates how well you did compared to the theoretical maximum. Now, let's talk about atom economy. It's like a report card for chemical reactions, telling us how efficient they are at producing the stuff we want. You also can't forget concentration, which is the amount of solute in a solution. And titration? That's the method used to measure out just the right amount of acid and base to neutralize each other. Time to get specific! Acids have a pH below 7, while alkalis are bases with a pH above 7. Pipettes and burettes are handy tools for measuring out exact amounts of solutions. And when values are close but not exactly the same? That's okay, as long as they're within a certain range (concordant). Now, let's test your skills! Q1: Calculate the number of moles in 10g of calcium carbonate... The Law of Conservation of Mass states that the total mass of reactants equals the total mass of products. This concept enables us to balance chemical equations, as no atoms can be lost or created. To write word equations, we use full chemical names for reactants and products, with the arrow implying conversion of reactants into products. For example, ammonia reacts with nitric acid to form ammonium nitrate: ammonia + nitric acid → ammonium nitrate. Similarly, iron(II) sulfate solution and sodium hydroxide combine to produce iron(II) hydroxide and sodium sulfate: iron(II) sulfate + sodium hydroxide → iron(II) hydroxide + sodium sulfate. Carbon, when burned in air, produces carbon dioxide: carbon + oxygen → carbon dioxide. Balanced chemical equations can be written using symbol equations, which employ the formulae of reactants and products. These equations demonstrate the conversion of reactants into products, with reaction conditions or catalysts written above the arrow if applicable. When writing chemical reaction symbol equations, ensure reactants are on the left and products on the right. Non-metals like hydrogen (H2), nitrogen (N2), oxygen (O2), fluorine (F2), chlorine (Cl2), bromine (Br2), and iodine (I2) should be written as molecules. It's essential to include state symbols like solid (s), liquid (l), gas (g), and aqueous (aq) correctly, though not always necessary unless asked specifically. Symbol equations must also be balanced to reflect the correct ratio of reactants to products. A good example is the combustion of sulfur: S (s) + O2 (g) → SO2 (g). In this equation, one sulfur atom reacts with one molecule of oxygen to produce one molecule of sulfur dioxide. Balancing equations involves ensuring the same number of atoms for each element on both sides of the reaction arrow, following the Law of Conservation of Mass. For instance, acid-base neutralisation: NaOH (aq) + HCl (aq) → NaCl (aq) + H2O (l). In this balanced equation, there are equal numbers of each atom on either side. Practice is key to mastering balancing equations, which can be done through trial and error by adjusting coefficients. In the example of aluminium reacting with copper(II) oxide to produce aluminium oxide and copper: _Al (s) + _CuO (s) → _Al2O3 (s) + _Cu (s), the balanced equation is 2Al (s) + 3CuO (s) → Al2O3 (s) + 3Cu (s). This involves balancing aluminium, oxygen, and copper atoms to ensure the same number on both sides. Similarly, when magnesium oxide reacts with nitric acid it forms magnesium nitrate and water. The balanced equation for this is MgO (s) + 2HNO3 (aq) → Mg(NO3)2 (aq) + H2O (l). This involves balancing magnesium, oxygen, nitrogen, hydrogen, and copper atoms correctly. MgO (s) reacts with HNO3 (aq) to form Mg(NO3)2 (aq) and H2O (l). The balanced equation is: MgO (s) + 2HNO3 (aq) ⟶ Mg(NO3)2 (aq) + H2O (l)